

BULLETIN

OF THE INSTITUTE OF METALS

VOLUME I

JUNE 1953

PART 22

INSTITUTE NEWS

Election of Fellow

The Council has elected SIR ARTHUR SMOUT (Past-President) a Fellow of the Institute in recognition of his long and distinguished services. The number of Fellows is limited to twelve, and Sir Arthur's election brings the present total to nine.

Arthur John Griffiths Smout was born at Birmingham on 18 November 1888, and was educated at King Edward's School, Birmingham, and the College of Technology, Birmingham. In 1905 he joined the Elliott Group of metal companies as a student apprentice.

From 1920 to 1924 he was Works Manager of Elliott's Metal Company and from 1924 to 1934 Production Director to the Elliott Group, which was merged into Imperial Chemical Industries, Ltd., in 1927. He became Managing Director in 1934 and was Chairman from 1934 to 1942 of what is now known as Imperial Chemical Industries, Ltd., Metals Division; he was appointed to the Main Board of Imperial Chemical Industries, Ltd., in 1944, with responsibility for the Company's metal, ammunition, and explosives interests. He retired from the Board earlier this year. He is Chairman of Murex, Ltd., and Murex Welding Processes, Ltd., a Director of Pyrotenax, Ltd., and a part-time member of the West Midlands Gas Board. He was Director-General of Ammunition Production at the Ministry of Supply from 1942 to 1945, and was knighted for his services in July 1946.

Sir Arthur has devoted much time to public service and to the advancement of science and industry. He is a Justice of

the Peace for the City of Birmingham and Member of the Magistrates' Courts Committee; a Life Member of the Court of Governors and Member of Council of the University of Birmingham; Member of the West Midlands Advisory Council for Further Education; Past-President of the Birmingham Chamber of Commerce; Chairman of the B.I.F. Management Committee; Vice-President of the Institution of Mining and Metallurgy; and a Member of Council of the British Non-Ferrous Metals Research Association and of the Copper Development Association.

He is a Fellow of the Royal Institute of Chemistry, a Fellow of the Institution of Metallurgists, and an Associate of the College of Technology, Birmingham. He holds the Insignia Award of the City and Guilds of London Institute, which was conferred upon him by H.R.H. The Duke of Edinburgh, in January, 1953.

Sir Arthur was elected a member of the Institute of Metals in 1917, since when he has given long and devoted service to the Institute. He was a Member of Council from 1924 to 1936 and from 1937 to 1940; a Vice-President from 1940 to 1943; a Member of Council from

1945 to 1946; a Vice-President from 1946 to 1948; President 1948-1950; and Past-President 1950-1953. During the course of these years he has served on many Committees of the Institute, notably in the important role of Chairman of the Finance and General Purposes Committee from 1946 until he assumed the Presidency.



SIR ARTHUR SMOUT, J.P.

Autumn Meeting, Southport, Monday to Friday, 21-25 September

Since going to Press with the May issue of the "Bulletin", Professor E. C. ROLLASON (University of Liverpool) has accepted an invitation to join the Reception Committee in connection with this meeting.

A change has also been made to the Provisional Programme. The all-day tour on Friday, 25 September will now be to North Wales and not to the Lake District.

It is hoped to distribute a full programme of the meeting late in June or early July.

Faraday Society Jubilee Celebrations

DR. L. B. PFEIL (Member of Council) represented the Institute at the Jubilee Celebrations of the Faraday Society in London on 16 April 1953.

Engineering, Marine, and Welding Exhibition and the Chemical Plant Exhibition, Olympia, London, 3-17 September 1953

The Council has accepted an invitation from the Organizers, for members of the Institute of Metals to pay an official visit to this Exhibition on Thursday, 10 September, next.

Tickets of invitation will be distributed to members in due course.

Binding Cases

The binding cases for the *Journal*, Vol. 80, and *Metallurgical Abstracts*, Vol. 19, 1951-52, are now available and are being sent to all those members who in the past have intimated their desire to receive the cases regularly. Any other members or non-member subscribers who wish to have the cases, which are available free, should apply to the Secretary without delay.

Members are reminded that, when having their issues for 1951-52 bound, they should retain the *Bulletin* sections, as the first volume of the *Bulletin* will not be completed until August 1953. A binding case for this volume will be made available subsequently.

Decennial Index to Metallurgical Abstracts

The Name Index volume of the decennial index to *Metallurgical Abstracts*, Vols. 1-10 (1934-43) has recently been published, and the Subject Index volume is in the press. The two volumes, which are not sold separately, may be obtained by members at a price of £4 4s., post free, and by non-members at £5 5s., post free. An order form was sent to all members with the April issue of the *Journal*.

The decennial index will prove invaluable to all those who have complete sets of *Metallurgical Abstracts*. Any members with gaps in their sets are invited to communicate with the Secretary, who may be able to supply the missing volumes.

"Properties of Metallic Surfaces"

The monograph containing the thirteen papers presented at the Symposium on "Properties of Metallic Surfaces" held last November, together with a full account of the discussion, is now in the press, and is due for publication in June.

The volume, which is No. 13 in the Institute's Monograph and Report Series, contains more than 350 pages and 150 illustrations. The published price is 35s. (\$5.50), post free, but each member can obtain one copy for 17s. 6d. (\$3.00), post free. Orders should be sent to the Secretary.

Summer School in the Use of Electrons in the Examination of Metals

Arranged by The Institute of Metals, in Co-operation
with the Board of Extra-Mural Studies, University
of Cambridge

A Summer School in "The Use of Electrons in the Examination of Metals" will be held in Cambridge this year. By courtesy of Professor Sir Lawrence Bragg, O.B.E., F.R.S., Professor G. W. Austin, O.B.E., and Dr. F. P. Bowden, F.R.S., the course will be held in the Cavendish and Goldsmiths' Laboratories and in the Laboratory for the Physics and Chemistry of Surfaces. The administration will be under the control of the Board of Extra-Mural Studies of the University of Cambridge. The teaching will be carried out by the following lecturers: Dr. A. F. Brown (Edinburgh University), Dr. V. E. Cosslett (Cavendish Laboratory, Cambridge), Mr. M. E. Haine (Associated Electrical Industries Research Laboratory, Aldermaston), Dr. J. W. Menter (Department of Physical Chemistry, Cambridge), and Dr. J. Nutting (Department of Metallurgy, Cambridge).

Purpose and Scope

In recent years summer schools in electron microscopy have been held in Cambridge, which have provided training in the theory of the electron microscope and its practical application to biological, physical, and metallurgical problems. The subject has now become so diverse that, in co-operation with the Institute, it has been decided to arrange a more specialized course on "The Use of Electrons in the Examination of Metals". This will consist of lectures, demonstrations, and practical classes in the principles of the electron microscope and electron-diffraction camera and their practical applications to the study of metals. Opportunity will be provided for operating and discussing the maintenance of the Metropolitan-Vickers, Siemens, and R.C.A. electron microscopes and the Edwards electron-diffraction camera.

Practice will be provided in the standard methods of specimen and replica preparation, and the new technique of reflection electron microscopy for the direct examination of metals will be discussed and demonstrated. A detailed syllabus can be obtained from the Secretary of the Institute of Metals. The opening lecture will be given by Professor A. G. Quarrell (Sheffield University) at 9.30 a.m. on Monday, 20 July. The school will end at 5 p.m. on Friday, 31 July.

Admission

It is necessary to limit the size of the Summer School, and it may not be possible to enrol all those who wish to attend. In order to assist the organizers, applicants are asked to complete a form of application which should be returned by 13 June. Applicants will be notified as soon as possible, and in any case not later than 26 June, whether it has been possible to accept their application or not.

Fees

The fee for attendance at the Summer School will be £20. The fee should not be sent with the original application. A registration fee of £2 will be due from those selected to attend as soon as they are informed to that effect, and the balance will be payable before the Summer School begins. If anyone has to withdraw after having been selected to attend, the return of the registration fee cannot be guaranteed, though a refund would be considered if the vacancy could be filled by another person.

Accommodation

A certain number of places for men have been reserved in Pembroke College, which is near to the Laboratories. The charge will be approximately 25s. per day. It is expected that some may be able to make their own arrangements for accommodation, and in other cases advice can be given about hotels, boarding-houses, &c. Unfortunately it is impossible to make any definite reservations in hotels at this stage on behalf of prospective members of the Summer School.

Details of the course and forms of application may be obtained from the Secretary of the Institute of Metals, and those interested should apply without delay.

"Acta Metallurgica": Privileged Rate of Subscription to Members of the Institute

As previously announced, each member of the Institute of Metals may subscribe to *Acta Metallurgica* at the privileged rate of £3 6s. per annum. Applications by members to subscribe at this rate must be sent to the Secretary of the Institute, accompanied by the appropriate remittance.

It is desired to make it clear that *all* members of the Institute, whether resident in the United Kingdom or not, are entitled to submit their subscriptions at this rate, through the Institute, if it is convenient to them to pay in sterling rather than in U.S. dollars.

Companies, libraries, &c., must subscribe, at the full rate of \$12.00 direct to the publishers; the Institute cannot receive and transmit such subscriptions.

Election of Members

The following 14 Ordinary Members and 5 Student Members were elected on 14 April 1953:

As Ordinary Members

- ALLEN, John, Metallurgist, Metals Division (IA), Royal Arsenal, Woolwich, London, S.E.18.
 ALLEN, Thomas, General Manager, G.W.B. Electric Furnaces, Ltd., Dibdale Works, Dudley, Worcs.
 ATKINSON, John Barnes, B.Sc., A.R.I.C., F.I.M., Senior Lecturer, Department of Metallurgy, College of Technology, Birmingham 1.
 BENNISON, Peter, A.R.Ae.S., Deputy Materials Engineer, Research Laboratory, Rolls Royce, Ltd., Derby.
 CLARK, Peter Howard, Technical Manager, McKechnie Bros., Ltd., Stratford, London, E.15.
 GLASER, Frank W., M.S., Physicist, American Electro Metal Corporation, 320 Yonkers Avenue, Yonkers 2, N.Y., U.S.A.
 HOCH, Alois, Dr.rer.nat., Metal Finishing Consultant, Radevormwald-Bergerhof, (Rhld.), Germany.
 MCPHERSON, Donald James, B.Met.E., M.Sc., Ph.D., Supervisor, Physical Metallurgy Research, Armour Research Foundation, 35 West 33rd Street, Chicago 16, Ill., U.S.A.
 MEIJERS, Cornelius Johannes, Chief of the Metallurgical and Technical Department, H. Drijfhout & Zoon's Edelmetaalbedrijven N.V., Amsterdam, Netherlands.
 van OUWERKERK, Ir. L., JMLzn., Manager, Röntgen Technische Dienst N.V., Overschie, Netherlands.
 van REENEN, Ir. J. C., Junior Managing Director, Rotterdamsche Droogdok Maatschappij N.V., P.O. Box 913, Rotterdam, Netherlands.

SAĞISMAN, Muzaffer, Dr.-Ing., Istanbul Teknik Üniversitesi, Makina Fakültesi Teknoloji Kürsüsü, Istanbul, Turkey.

STAP, Ir. M., Engineer, Nederlands Koperenbuinen Fabriek, Leiderdorp, Netherlands.

WHINFREY, Charles George, B.Sc., Research Chemist and X-Ray Crystallographer, Research Centre, Johns-Manville Corporation, Manville, N.J., U.S.A.

As Student Members

BUCKLEY, S. N., B.Sc., Research Student, Department of Metallurgy, University of Manchester.

HAHN, Henry, M.S., Graduate Student and Research and Teaching Associate, Department of Metallurgy, Rensselaer Polytechnic Institute, Troy, N.Y., U.S.A.

JONES, Richard Lee, M.S., Graduate Student of Metallurgical Engineering, University of Michigan, Ann Arbor, Mich., U.S.A.

KING, Alan John, Student of Metallurgy, Battersea Polytechnic, London, S.W.11.

MIKUS, Emil Bill, M.S., Graduate Student of Metallurgy, University of Michigan, Ann Arbor, Mich., U.S.A.

The following 8 Ordinary Members, 1 Junior Member, and 4 Student Members were elected on 30 April 1953:

As Ordinary Members

- BLAKE, Albert Leonard, General Manager, Cable Makers Australia Pty., Ltd., Liverpool, N.S.W., Australia.
 CALVO, Felipe Angel Calvo, Chemist, Instituto de la Soldadura, Goya 58, Madrid, Spain (temporarily at the Department of Metallurgy, University of Cambridge).
 DIRKSE, Philippe Marie Jean Louis, Dipl. Ing., Chief, Central Repair Department, N.V. Oranje Nassau Mijnen, Heerlen, Netherlands.
 FRANKEL, Herbert A., B.S., Secretary, Foundry Services, Inc., 280 Madison Avenue, New York 16, N.Y., U.S.A.
 JOLLIE, Andrew, M.Eng., B.Sc., M.I.Mech.E., M.Inst.F., Director and General Manager, Steel, Peech and Tozer (Branch of The United Steel Companies, Ltd.), The Ickles, Sheffield 1.
 REEVE, Major Reginald William, T.D., Technical Director, South African Light Metal Works (Pty.), Ltd., P.O. Box 4305, Cape Town, South Africa.
 SCHWOPE, Arthur D., B.Ch.E., M.S., Supervisor of Mechanical Metallurgy, Battelle Memorial Institute, Columbus, O., U.S.A.
 YOUNG, Melvin H., B.S., Director, Engineering Production Services, Wright Aeronautical Division, Wood Ridge, N.J., U.S.A.

As Junior Member

MUKHERJEE, Prabhat Charan, B.E., 16 Hilgrove Road, London, N.W.6.

As Student Members

- EVANS, Dain Stedman, Student of Metallurgy, University College, Swansea.
 GLOVER, Stanley George, B.Sc., Research Student, Department of Metallurgy, University of Birmingham.
 STOBO, James Jack, B.Sc., Research Student, Metallurgy Department, Royal Technical College, Glasgow.
 THORNEWELL, Gordon Leonard, Laboratory Assistant, The Mond Nickel Co., Ltd., Development and Research Laboratory, Wiggin Street, Birmingham 16.

Committees for 1953-54

Finance and General Purposes Committee

BAER, Mr. Alfred (*Chairman*).
 BAILEY, Mr. G. L.
 GRAHAM, Mr. A. B.
 MURPHY, Professor A. J.
 RAMSAY, Dr. A. G.
 SMITHELLS, Dr. C. J.
 TASKER, Mr. H. S.
 TEED, Major P. L.

Ex-officio :

THOMPSON, Professor F. C. (*President*).
 DOREY, Dr. S. F. (*Senior Vice-President*).
 JONES, Mr. E. H. (*Honorary Treasurer*).
 SMITH, Mr. C. (*Chairman, Publication Committee*).

Local Sections Committee

PFEIL, Dr. L. B. (*Chairman*).
 ASHTON, Mr. A. B.
 GARSIDE, Dr. J. E.
 KENNETT, Dr. S. J.
 WALTON, Mr. J. S.

Ex-officio :

THOMPSON, Professor F. C. (*President*).
 DOREY, Dr. S. F. (*Senior Vice-President*).
 JONES, Mr. E. H. (*Honorary Treasurer*).
 SYMONDS, Mr. H. H. (*Chairman, Birmingham Local Section*).
 MATTHEWS, Mr. A. W. (*Honorary Secretary, Birmingham Local Section*).
 RANSLEY, Dr. C. E. (*Chairman, London Local Section*).
 RHODES, Dr. E. C. (*Honorary Secretary, London Local Section*).
 PARKER, Dr. R. T. (*Chairman, Oxford Local Section*).
 SMITH, Mr. O. R. (*Honorary Secretary, Oxford Local Section*).
 FOWLER, Mr. E. A. (*Chairman, Scottish Local Section*).
 HAY, Mr. Matthew (*Honorary Secretary, Scottish Local Section*).
 MADDOCKS, Dr. W. R. (*Chairman, Sheffield Local Section*).
 MACDOUGALL, Mr. A. J. (*Honorary Secretary, Sheffield Local Section*).
 SPRING, Mr. K. M. (*Chairman, South Wales Local Section*).
 CUNNIFFE, Mr. P. W. A. (*Honorary Secretary, South Wales Local Section*).

Metal Physics Committee

RAYNOR, Professor G. V. (*Chairman*).
 AXON, Dr. H. J.
 BAILEY, Dr. G. L. J.
 CHRISTIAN, Dr. J. W.
 FINNISTON, Dr. H. M.
 FRANK, Dr. F. C.
 GEACH, Dr. G. A.
 HANSTOCK, Dr. R. F.
 HIGNETT, Mr. H. W. G.
 KING, Mr. R.
 MCLEAN, Mr. D.
 NUTTING, Dr. J.
 OLIVER, Mr. D. A. (representing the Iron and Steel Institute and the British Iron and Steel Research Association).
 RICHARDS, Dr. T. Ll.
 SULLY, Dr. A. H.
 WAKEMAN, Dr. D. W.

Ex-officio :

THOMPSON, Professor F. C. (*President*).
 SMITH, Mr. C. (*Chairman, Publication Committee*).

Metallurgical Engineering Committee

THOMAS, Mr. W. J. (*Chairman*).
 BAKER, Mr. W. A.
 BOLTON, Mr. E. A.
 BOND-WILLIAMS, Mr. N. I.
 BOWMAN, Mr. W. H.
 CAMPBELL, Mr. D. F.
 DAVIES, Mr. C. E.
 FORD, Professor H.
 LAKE, Mr. N. C.
 MILLER, Mr. H. J.
 PATON, Mr. C. P.
 SALTER, Mr. J.
 SINGER, Dr. A. R. E.
 SWINDELLS, Dr. N.
 WALTON, Mr. J. S.
 WILKINSON, Mr. R. G.

Ex-officio :

THOMPSON, Professor F. C. (*President*).
 SMITH, Mr. C. (*Chairman, Publication Committee*).

Publication Committee

SMITH, Mr. Christopher (*Chairman*).
 BAILEY, Mr. R. W.
 BAKER, Mr. W. A.
 FINNISTON, Dr. H. M.
 FORD, Professor H.
 HUDSON, Mr. F.
 INGLIS, Dr. N. P.
 JENKINS, Dr. Ivor.
 PARKER, Dr. R. T.
 PFEIL, Dr. L. B. (representing Local Sections Committee).
 PHILLIPS, Mr. H. W. L.
 POWELL, Mr. A. R.
 SHOWELL, Mr. D. W. D.

Ex-officio :

THOMPSON, Professor F. C. (*President*).
 BAER, Mr. A. (*Chairman, Finance and General Purposes Committee*).
 JONES, Mr. E. H. (*Honorary Treasurer*).
 RAYNOR, Professor G. V. (*Chairman, Metal Physics Committee*).
 THOMAS, Mr. W. J. (*Chairman, Metallurgical Engineering Committee*).

The constitution of certain Committees is fixed by standing orders of the Council, as follows :

Medal Committee

PRESIDENT (*Chairman*).
 SENIOR VICE-PRESIDENT

and

Not more than four Institute of Metals (Platinum) Medalists who are, or have been, members of the Council (to be selected by the President), with power to the President to co-opt not more than two other persons.

Nominations Committee

PRESIDENT.
 TWO IMMEDIATE PAST-PRESIDENTS.
 SENIOR VICE-PRESIDENT.

PERSONAL NOTES

MR. J. R. ABRAHAM has left for New Plymouth, New Zealand, to take up the appointment of Managing Director of McKechnie Bros. (N.Z.), Ltd.

PROFESSOR SIR LAWRENCE BRAGG has been appointed Fullerian Professor of Chemistry at the Royal Institution and Resident Professor and Director of the Davy Faraday Research Laboratory. He will take up the duties of the Fullerian professorship at once and the laboratory and resident duties on 1 January 1954.

MR. A. R. G. BROWN has left the British Iron and Steel Research Association and joined the staff of the Royal Aircraft Establishment, Farnborough, as a Senior Scientific Officer.

DR. G. P. CONTRACTOR, who has been Acting Director of the National Metallurgical Laboratory of India for three and a half years, relinquished his position with the Indian Council of Scientific and Industrial Research at the end of April. He is leaving India in August, and will visit Great Britain on his way to Canada.

DR. F. A. FOX delivered the guest lecture at the Annual General Meeting of the Australian Institute of Metals held last month in Brisbane.

PROFESSOR ANDRÉ GUINIER delivered the Robert S. Williams lectures in the Department of Metallurgy, Massachusetts Institute of Technology, on 10-12 March. He spoke on "Precipitation Phenomena in Supersaturated Alloys" and "Recent Progress in X-Ray Crystallography".

MR. M. M. HALLETT has been appointed Director of Sales to Sheepbridge Engineering, Ltd., Chesterfield. He was previously Research and Development Manager to the Company.

MR. H. E. JACKSON has relinquished the Chairmanship of the Metals Division of Imperial Chemical Industries, Ltd. He will retire from the Metals Division at the end of June when his period of office as President of the British Non-Ferrous Metals Federation comes to an end.

MR. J. F. B. JACKSON, who has been Director of Research to the British Steel Founders' Association since the formation of its Research and Development Division in 1949, has been appointed Director of the recently formed British Steel Castings Research Association.

MR. F. A. LYTTON has taken up a post with William Jessop and Sons, Ltd. He was previously with The Morgan Crucible Co., Ltd.

MR. J. A. MATTHEWS has been made a Liveryman of the Worshipful Company of Farriers and a Freeman of the City of London.

MR. W. J. NEAGLE-JONES has been appointed Chief Metallurgist to Brockworth Engineering Co., Ltd., Hucclecote, Gloucester.

MR. C. E. PROSSER has been appointed Chairman of the Metals Division of Imperial Chemical Industries, Ltd., in succession to Mr. H. E. Jackson.

MR. K. SACHS has been awarded the Ph.D. degree of London University.

MR. A. W. TRASH, Chief Chemist to H. J. Enthoven and Sons, Ltd., has retired after 44 years' service with the Company. He will, however, continue to act as Consultant to the Enthoven Organization.

OBITUARY

Mr. Douglas Jepson

The death of Mr. Douglas Jepson, at the age of 51, occurred on 24 February 1953 after a short illness.

Mr. Jepson was born at Glossop, Derbyshire, and passed from the Grammar School there to the University of Manchester, where he graduated in 1922 with 1st Class Honours in Metallurgy. After a period of research work, the degree of Master of Science was conferred on him in 1923. From 1924 to 1927 he held the post of Assistant Lecturer in Electrochemistry at the University of Manchester. In 1927 he entered industry, and from then until 1940 he held a number of appointments with I.C.I., Ltd. (General Chemical Group) at Middlewick, Runcorn, and Billingham, where he gained valuable experience as a metallurgist, in plant management, and in special problems arising in industry. In 1940 he returned to the teaching profession as Lecturer in Metallurgy at Bradford Technical College and went from there to Birmingham, where he was appointed Senior Assistant in the Department of Metallurgy at the then Central Technical College, in 1945. Two years later he was appointed Head of the Department of Metallurgy at the College of Technology in succession to the late Dr. F. Johnson.

In this capacity he had been much occupied with the planning and equipment of the metallurgy laboratories in the new College now in course of erection. In addition, he was an active member of a number of Committees, including the Service and Publicity Committee and the Standing Committee on Matters Concerning Metallurgical Education and Training, both of the Institution of Metallurgists; the Joint Committee on Metallurgical Education of the principal metallurgical institutions in the country; the Education Committee of the Institute of British Foundrymen; the West Midlands Advisory Council for Technical, Commercial, and Art Education; and the Council of the Birmingham Metallurgical Society. In addition, he was a member of the Iron and Steel Institute, the Institution of Metal Finishing, and the American Society for Metals. He was elected a member of the Institute of Metals in 1920. Mr. Jepson also took a keen interest in the affairs of the Parish Church at Erdington, Birmingham, and was one of the Managers of the School associated with that Church.

He is survived by a widow, two sons, and a daughter.

W. E. THORNEYCROFT.

LETTERS TO THE EDITOR

The Development of a High-Strength Non-Magnetic Alloy

The magnetic measurements made by the Danish deep-sea expedition in the ship *Galathea* in 1950-52 have been reported recently.¹

To contain the magnetometers used in these measurements, spheres were required which would withstand the water pressure even at the greatest depths. Calculation showed that the material for the sphere must have a yield strength in compression of at least 28 kg./mm.², and further it had to be completely non-magnetic. As the spheres were very heavy, with a wall thickness of 4 in. and a finished weight of 2500 lb., it was decided to cast them.

None of the existing casting alloys proved suitable, however. A special austenitic steel that was tested had adequate strength, but failed in the magnetic tests under stresses in the region of the yield point. The only light alloy which was sufficiently strong had to be forged and heat-treated, and the cost of the spheres would have been very high. Non-magnetic aluminium bronzes were considered to be too difficult to cast, and their yield strength too low. Beryllium bronze might have been sufficiently strong, but experience in the casting and heat-treatment of such large objects was lacking. Manganese bronze without iron has normally too low a yield point, and with iron it is slightly magnetic.

It was necessary, therefore, to develop a new alloy, and in the spring of 1950 the writer undertook this task, in the laboratories of Paul Bergsøe and Son, Copenhagen. Some iron-free manganese bronzes were first tried, and it was confirmed that iron was a necessary constituent if a sufficiently

The microstructure contained β crystals and small particles of "blue phase" (Fig. 1). The alloy was very susceptible to stress-corrosion, but as the spheres were to be exposed to sea-water only intermittently and for a short time only on each occasion, this was considered unimportant. No trouble was

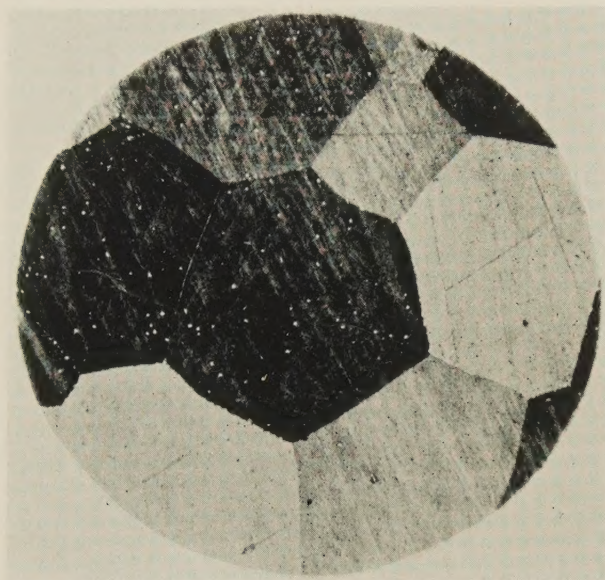


FIG. 1.—Structure of Galathea Bronze. $\times 150$.

high yield point was to be attained. It was then decided to replace iron by another, non-magnetic, element. In manganese bronzes iron is to be found as a "blue phase", which consists of iron saturated with copper, and which seems to influence the grain-size of the material considerably. It appeared to be necessary to find an element which would behave similarly to iron in copper alloys, and chromium was accordingly tried. It showed the same effect as iron, and finally an alloy was made which fulfilled all requirements.

The composition chosen was quite unorthodox: copper 62, aluminium 5, manganese 2, chromium 0.5%, balance zinc. Even with 0.1% iron, it was completely non-magnetic. Mechanical tests showed that the yield point in compression was very similar to that in tension, being 38 kg./mm.² (0.2% permanent set) and the alloy appeared to be fully elastic up to 28 kg./mm.². The tensile strength was 70–80 kg./mm.², with an elongation of 10–20%. The alloy was no more difficult to cast than the ordinary manganese bronzes and was not liable to absorb gases, owing to the presence of zinc. The castings were completely pressure-tight.

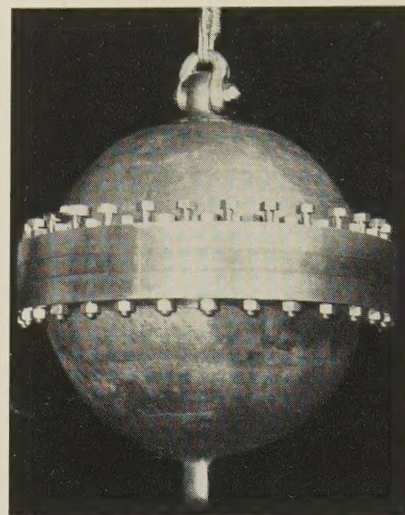


FIG. 2.—Sphere Used by Danish Deep-Sea Expedition.

experienced in this respect even in the most highly stressed parts of the sphere, namely, the bolts with which the two halves were connected (Fig. 2).

The alloy has been named "Galathea bronze", and the spheres have been tested several times in the Philippines trench, where one sphere touched bottom at about 10,000 m.

BØRGE LUNN

Copenhagen.

REFERENCE

1. *Nature*, 1953, **171**, (4348), 383.

Crystallization of β -Brass

The dendrite is, as it were, the metallurgist's *pièce de résistance*, and recently the subject of dendritic crystallization has



FIG. 1.—Dendrites in the Secondary Pipe of Sand-Cast β -Brass. $\times 5$.

been receiving further attention. β -brass is interesting in this connection because it is representative of a large class of alloy constituents. Normally, no evidence of dendritic growth is obtained from the microstructure; the grains are

homogeneous in appearance and the smooth boundaries rather belie dendritic formation.

However, it has been possible to show that dendritic crystallization can occur in β -brass (made from cathode copper and 99.99% zinc). Clear evidence has been found in the secondary pipe of sand castings made in this alloy (Fig. 1). Further, dendrites have been detected in samples chill cast in contact with molten lead (Fig. 2).

From consideration of the equilibrium diagram, selective crystallization is to be expected in β brass, resulting in coring with practical rates of cooling, as occurs in the α phase. The writer has examined microscopically many samples of cast β -brass and in none detected the slightest signs of coring. In addition, analysis of samples taken from the outside and centre of cast material, even when quenched from a high tem-

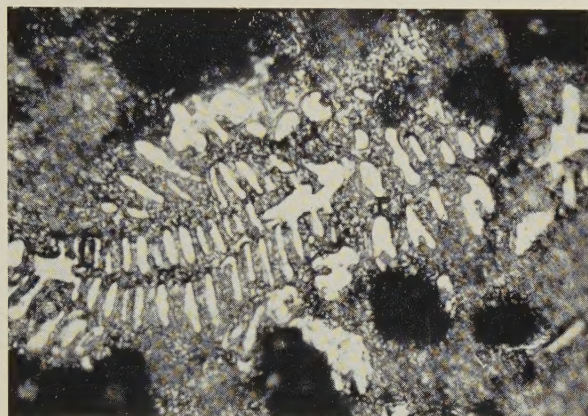


FIG. 2.—Dendrites of β -Brass (light) in Matrix of Lead. $\times 600$.

perature, has as yet failed to indicate any segregation which might arise from selective crystallization. The apparent explanation would be that the atomic movements accompanying the subsequent ordering process are sufficient to even out the composition, rather than that the rate of diffusion of zinc in the β structure is markedly greater than that in the α structure.

A. R. BAILEY

Constantine Technical College,
Middlesbrough.

NEWS OF LOCAL SECTIONS AND ASSOCIATED SOCIETIES

Officers and Committees for Session 1953-54

Birmingham Local Section

Chairman : H. H. Symonds, F.I.M.
Vice-Chairman : S. S. Smith, M.Met., F.I.M.
Hon. Treasurer : R. Chadwick, M.A., F.R.I.C., F.I.M.
Hon. Secretary : A. W. Matthews, L.I.M.
Asst. Hon. Secretary : P. Hutchinson.
Past-Chairmen : B. Thomas, F.Inst.P.; E. A. Bolton, M.Sc., F.I.M.; R. Chadwick, M.A., F.R.I.C., F.I.M.
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Sheffield Local Section

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Vice-Chairman : A. Edwards, Ph.D., B.Sc., F.I.M.
Hon. Secretary and Treasurer : A. J. MacDougall, M.Met., F.I.M.
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South Wales Local Section

Chairman : K. M. Spring, A.I.M.
Hon. Secretary : P. W. A. Cunliffe.
Hon. Treasurer : P. J. Liptrot, M.Eng., A.I.M.
Past-Chairmen : E. A. Hontoir, B.Sc., A.I.M.; D. W. Hopkins, M.Sc., F.I.M.
Ordinary Members : C. F. J. Francis-Carter, O.B.E.; H. C. Hulme; R. H. Humphries (representing Associate Members); B. J. Jones, L.I.M. (representing Junior Members); T. B. Marsden (representing Student Members); Professor H. O'Neill, D.Sc., M.Met., F.I.M.; J. S. Walton.

JOINT ACTIVITIES

London Local Section

At a meeting of the Section held at 4 Grosvenor Gardens, London, S.W.1, on 5 March, Dr. B. A. BILBY gave a lecture on:

Dislocations in Crystals

This lecture, which was arranged by the Metal Physics Committee, has been given before a number of Local Sections and Associated Societies, and a summary of it will be found on p. 179 of the *Bulletin* for March 1953.

JOINT ACTIVITIES

Sir George Beilby Memorial Award, 1952

The Administrators of the Sir George Beilby Memorial Fund, representing the Institute of Metals, the Royal Institute of Chemistry, and the Society of Chemical Industry, have made an award from the Fund for 1952 of one hundred and fifty guineas to

THOMAS VICTOR ARDEN, B.Sc., F.R.I.C.,

in recognition of his experimental work on the hydro-metallurgy of uranium, with particular application to the separation of uranium from low-grade ores. This work has been carried out at the Chemical Research Laboratory, Teddington, since 1946, though little of it has been published so far. Mr. Arden has also taken a leading part in the development and operation of treatment plants for uranium ores in various parts of the world. He has recently left the Chemical Research Laboratory to join the Permutit Co., Ltd., as head of the Applied Ion-Exchange Department.

Awards from the Fund are made to British investigators in science as a mark of appreciation of distinguished work, particularly in such fields as fuel economy, chemical engineering, and metallurgy in which Sir George Beilby's special interests lay. In general, the awards are not applicable to more senior investigators, but are granted as an encouragement to relatively young men who have done independent work of exceptional merit over a period of years.

NEWS OF KINDRED SOCIETIES

Deutsche Gesellschaft für Metallkunde: General Meeting, Nürnberg, 4-6 September 1953

The General Meeting of the Deutsche Gesellschaft für Metallkunde will be held in Nürnberg from Friday to Sunday, 4-6 September, inclusive. The main subject for discussion will be "The Hot Working of Non-Ferrous Metals". Further details will be published in due course.

Members of the Institute of Metals will be welcome at this meeting, the full programme of which can be obtained on application to The Secretary, Deutsche Gesellschaft für Metallkunde E.V., Alteburger Str. 402, Köln/Rh., Germany.

Société Française de Métallurgie: Autumn Meeting, Paris, 19-23 October 1953

The Journées Métallurgiques d'Automne, organized by the Société Française de Métallurgie, will take place in Paris from Monday to Friday, 19-23 October.

A cordial invitation for members of the Institute of Metals to attend this meeting is extended by the Société.

Particulars of the meeting, and of membership of the Société, may be obtained from the Secrétaire-Général, Société Française de Métallurgie, 25 rue de Clichy, Paris (9e).

OTHER NEWS

Groupement pour l'Avancement des Méthodes Spectrographiques

The sixteenth congress of the Groupement pour l'Avancement des Méthodes Spectrographiques will be held on 24-26 June 1953 at the headquarters of the Association des Ingénieurs des Arts et Métiers, 9 bis Avenue d'Iéna, Paris. Technical sessions will take place on the afternoon of 24 June and the mornings of 25 and 26 June. There will be a visit to the Renault laboratory and works on the afternoon of 25 June, and an excursion is being arranged for the afternoon of 26 June. Full details may be obtained from G.A.M.S., 1 Place Saint-Thomas d'Aquin, Paris (7e).

Exhibition of X-Ray Crystallographic Equipment

The X-Ray Analysis Group of The Institute of Physics announces that its autumn conference will be held in London on 20 and 21 November, and an exhibition of X-ray-diffraction equipment will be an important feature of it. Offers of exhibits are invited under two headings: (a) apparatus commercially available in this country and (b) examples of recent developments in X-ray crystallographic equipment that have been made in universities and other research centres in this country. Examples of the kind of exhibit envisaged are: X-ray tubes, diffraction cameras of all types, microbeam techniques, counters and counter-spectrometers for diffraction work, any aids to interpretation, monochromators, micro-densitometers, travelling microscopes, X-ray films and photographic accessories, and spectrometers for fluorescent analysis. Owing to the limited space available, a selection will no doubt have to be made from the offers submitted.

Offers of exhibits, giving details of approximate bench and floor space required and of any services needed, should be submitted before 1 September to the Conference Secretary, Mr. H. J. Goldschmidt, F.Inst.P., c/o The Institute of Physics, 47 Belgrave Square, London, S.W.1.

Appointments Vacant will be found on p. (a), at the end of "Metallurgical Abstracts".